

of these waterfalls is that of Milford Water, and is shown in Fig. 1. This, moreover, is only the first fall of the stream from a level of about 160 feet above the sea; below it is a cañon, in which are three smaller falls before the stream reaches the beach. Fig. 2 is a side view of the same fall from below, showing the synclinal flexure of the rocks at this point, and the manner in which the stream turns at right angles along the syncline. After going for 132 yards to the south it again turns west across the strike of the rocks, a curious and interesting instance of the relation of stream channels to rock structure.

Part ii. of the book deals with some features of special geological interest, these being the marine erosion of folded rocks, sea-dissected valleys, and the evolution of coastal waterfalls. The author points out that the usual text-book explanation of bays and promontories along a sea-coast is not always the true one. They do not always coincide with the outcrops of softer and harder rocks. Some of the irregularities of the Devon coast seem to be due to the influence of previously existing physiographic features, the bays coinciding with the sites of valleys and the promon-



FIG. 2.—The First Fall of Milford Water and the synclinal fold, looking north. From "The Coast Scenery of North Devon."

tories with the dividing watershed ridges. Others are due to the influence of the flexures, and he finds that the anticlines are more stable under the action of sea erosion than are the synclines, while on land under the action of subaërial agencies the reverse is the case.

Mr. Arber has certainly succeeded in showing how many points of interest there are along this piece of coast-line, both for the geological student and for the intelligent tourist.

A. J. J.-B.

#### NOTES.

THE present summer is establishing a record for its high temperatures, and in many places for its persistent drought. At Greenwich the mean temperature for July was  $68.3^{\circ}$ , which is  $4.6^{\circ}$  above the average for the past sixty years. The mean of the day temperatures was  $81^{\circ}$ , and of the night temperatures  $55.5^{\circ}$ . There were nineteen days during the month with the shade temperature above  $80^{\circ}$ , and three days above  $90^{\circ}$ . This is the greatest number of days in July above  $80^{\circ}$  since 1868, and the third highest number

since 1841. The highest shade temperature during the month at Greenwich was  $95.6^{\circ}$  on July 22, and the only two instances of a higher temperature at any period of the year are  $97.1^{\circ}$  on July 15, 1881, and  $96.6^{\circ}$  on July 22, 1868. There were seven days after July 20 with the thermometer in the sun's rays about  $150^{\circ}$ , and on July 22 the black bulb thermometer registered  $161^{\circ}$ . The duration of sunshine for the month was 331 hours, which is nearly 100 hours more than the average. No rain was measured until July 24, the period of drought being the longest in July since 1887. The aggregate rainfall for the month was 0.26 inch, which fell on three days. This is the driest July since 1864, and there is no other July so dry since 1841. At Bath, July was absolutely rainless. The reports received by the Meteorological Office give the following additional high temperatures:—On July 21 the thermometer registered  $90^{\circ}$  both at Oxford and Margate, on July 22  $94^{\circ}$  at Margate, on July 29  $93^{\circ}$  at Bath and  $91^{\circ}$  at Oxford. The type of weather was anticyclonic almost continuously throughout the month, and the region of high barometer readings extended over a large part of western Europe, where exceptionally high temperatures occurred almost throughout the month. At Rochefort the thermometer registered  $93^{\circ}$  on July 6, at Lorient  $95^{\circ}$  on July 7,  $97^{\circ}$  on July 8, and  $99^{\circ}$  on July 9. On July 14 the temperature at Rochefort was  $100^{\circ}$ , and at Stockholm  $95^{\circ}$ . Paris had a temperature of  $96^{\circ}$  on July 22 and 23, Frankfurt  $100^{\circ}$  on July 23. From July 24 to 29 several stations in France and Belgium had temperatures from  $95^{\circ}$  to  $98^{\circ}$ . Some exceptionally severe thunderstorms occurred during the month; on July 28 1.1 inches of rain fell in fifteen minutes at South Kensington, and on July 29 2.14 inches fell in 2½ hours at Kilkenny.

FOR the moment the remarkable archæological discoveries in Corfu have thrown other work in the eastern Ægean into the shade. But in various parts of this area, in the Greek mainland and islands, much progress has been made, the results of which are described in an interesting article in *The Times* of July 31. The Greek Archæological Society has restored the Propylæa on the Athenian Acropolis; repairs have been carried out at Mycenæ; and the museum at Olympia has been converted into a safe receptacle for its treasures. The French Mission at Delos has unearthed images of Egyptian and Syrian gods which illustrate the adoption of foreign cults into the religion of Greece; and some progress has been made at the island of Levkas (Santa Maura), which Dr. Dörpfeld believes to be the Homeric Ithaca. The British School has been at work on the Menelaion, the tomb of Menelaus and Helen at Sparta. Phylakopi, in Melos, the seat of an early trade in weapons of obsidian, has yielded some good vases imported from Crete. An appeal is now made for help towards the explorations in Macedonia, conducted by Messrs. A. J. B. Wace and M. Thompson, where important results in the examination of prehistoric, classical, Byzantine, and mediæval antiquities may be confidently expected.

PROF. CZERMAK, of the Brünn High School, who died on July 11 at the age of seventy-seven years, left, says the *Revue Scientifique*, a million crowns to the Vienna Academy of Sciences.

IT is announced in *The Times* that M. Ernest Mercadier, formerly director of studies at the École Polytechnique, died on July 27 in his seventy-sixth year. M. Mercadier entered the French telegraph service in 1859, and held the

post of director of telegraphs during the siege of Paris, when he likewise organised the military telegraph service. After the war he became professor of physics at the Ecole Supérieure de Télégraphie, and in 1881 he was appointed director of studies at the École Polytechnique, where he remained until the end of the year 1903. He was an honorary member of the Institution of Electrical Engineers and of the International Society of Electricians.

We regret to learn that Mrs. Helena B. Walcott, wife of Mr. Charles D. Walcott, formerly director of the United States Geological Survey, now secretary of the Smithsonian Institution, was instantly killed in a railway accident at Bridgeport, Connecticut, on July 11. Mrs. Walcott had been ardently and actively interested in the scientific work of her husband. In 1888 she accompanied him to Newfoundland, where they worked out together the key to the succession of the Cambrian formations of the North American continent. They then crossed to Wales and studied the classical Cambrian sections. For eighteen seasons she accompanied Mr. Walcott on his expeditions in connection with geological researches in various regions of eastern and western United States and Canada. Since his appointment as secretary of the Smithsonian Institution she had been greatly interested in the development of the United States National Museum and in the general study of museum systems. Possessed of unusual charm of person and manner, Mrs. Walcott's death is a heavy blow to a large circle of friends and acquaintances.

THE fifth annual meeting of the Italian Society for the Advancement of Science will be held in Rome on October 12-18, under the presidency of Prof. G. Ciamician. The sections of the association, with their presidents, are as follows:—mathematics, astronomy, and geodesy, Prof. G. Castelnuovo and Prof. A. Di Legge; physics, Prof. P. Blaserna; applied mechanics and electro-technics, Prof. C. Ceradini; pure and applied chemistry, Prof. E. Paternò; mineralogy and geology, Prof. R. Meli; geography, Prof. E. Millosevich; zoology, anatomy, and anthropology, Profs. G. B. Grassi, F. Todaro, and G. Sergi; pure and applied botany, Prof. R. Pirotta; physiology, Prof. L. Luciani; pathology, Profs. A. Bignami and E. Marchiafava; history and archaeology, Profs. G. Beloch and L. Pigorini; philology, Prof. I. Guidi; social science, Prof. M. Pantaleoni; philosophy, Prof. P. Ragnisco. Several lectures on subjects of wide scientific interest will be delivered to general meetings of the association as a whole, and others to joint meetings of sections concerned with related subjects. Full particulars may be obtained from the secretary, to whom contributions for the sections should be addressed, Prof. V. Reina, Via del Collegio Romano 26, Roma.

In the first part of the second volume of the Museum Journal of the University of Philadelphia we find an interesting account of an exploration of the remarkable ruined city of Chichen Itza, in Yukatan. The place is familiar to students of Central American archaeology from the enthusiastic accounts of Stephens with Calderwood's drawings, the photographs and measurements of Maudslay, and the sketches of Holmes. These, however, only imperfectly represent the decoration scheme, and for the frescoes and wall sculptures the only existing record is the fine series of water-colour drawings by Miss Adela Breton, who with rare devotion has succeeded in reproducing the beautiful work of the ancient artists. These drawings are as yet unpublished, and all students of art will join in the hope that arrangements may soon be made for their publication.

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It is a good omen for the scientific value of the reports of the recent census of India, which are now in process of compilation, that Mr. E. A. Gait, the census commissioner, has prepared for the use of the provincial superintendents an abstract of several important reviews by eminent Continental anthropologists of the report by Sir H. Risley on the census of 1901. These criticisms are of much importance, and direct special attention to certain problems for the solution of which the reports of the last census may be expected to supply valuable material. Of special interest are the suggestions of Herr Baelz on the peculiar skin patches which seem to be a race characteristic of the Mongolians; Walcher's review of the results of artificial changes in the skull form; and Surgeon Captain E. P. Maynard's remarkable discovery among some coolies at the tea gardens of Assam of a curious form of melanoglossia which seems to be peculiar to certain of the Munda tribes of Chota Nagpore, and may be of great importance in identifying the modifications of this ethnical type.

IN vol. iv., part iii., of the Transactions of the Hull Scientific and Field Naturalists' Club Mr. T. Pickersgill describes a remarkable collection of Roman coins made at South Ferriby by the well-known Thomas Smith, locally known as "Coin Tommy," which has recently been acquired by the Hull Municipal Museum. South Ferriby, lying on the direct route between Lincoln and York, was obviously a place of considerable importance in Roman times, and the interest of this collection lies in the fact that its 2600 specimens practically cover the whole period of the Roman occupation of north Lincolnshire. It begins with a coin of the Emperor Trajan (A.D. 98), and extends to the time of Honorius (A.D. 395-423), in whose reign the Romans finally withdrew from Britain. The collection includes the coins of thirty-nine emperors and members of their families, several of the wives of the emperors being represented. Mr. Pickersgill gives a full catalogue of these coins, with details of their mintage, and supplies two sheets of photographic reproductions of the most typical specimens, a valuable monograph which will be of interest to all numismatists.

IN *The Eugenics Review* for July (x., No. 2) Sir Thomas Oliver directs attention to the disastrous effects of lead-poisoning on the race, particularly among potters. Lead-poisoning, insufficient definitely to cripple the workers, has a disastrous effect on the reproductive organs; females who work in lead before marriage miscarry twice, and females working in lead after marriage miscarry three times, more frequently than those engaged in ordinary housework. A high percentage of children born alive to lead workers die shortly after birth and during the first few months of life. Some of the worst effects of lead-poisoning are to be seen among the small pottery manufacturers of Hungary, of which Sir Thomas Oliver gives a graphic account.

UNDER the title of "The Hunted Otter," the Animals' Friend Society, Kingsway, W.C., has published a pamphlet urging the total prohibition of otter-hunting. While all, we hope, will support the proposal to establish a close time during the breeding season, it by no means follows that public opinion will demand the entire abolition of the sport of otter-hunting.

*The Victorian Naturalist* for June contains an obituary notice of the late Mr. A. O. Sayce, who was appointed demonstrator and assistant lecturer in bacteriology in Melbourne University six years ago. In addition to bacteriology, Mr. Sayce devoted special attention to crustaceans, on which he wrote numerous papers, the most



important being one on the new malacostracous genus *Koonunga*. In recognition of the value of his work, Mr. Sayce was elected some years ago an associate of the Linnean Society of London.

In the July number of *The Museums Journal* Mr. C. O. Waterhouse directs attention to the urgent need for a very great extension in the space allotted to the study series of insects in the natural history branch of the British Museum—a subject which appears to have been in some degree overlooked during the recent discussion with regard to the disposal of the ground at the back of the building. At present the collection is housed in rooms originally described as workshops, where it is crowded to an almost unimaginable extent. The writer pleads for two new galleries for the entomological study series, and gives two alternative plans for such extension. In the second of these it is suggested that the present main front of the building should be continued to Queen's Gate, and the continued galleries used for public exhibition, with a further extension from the present west tower, at first northward and then westward, so as to form an open quadrangle facing Queen's Gate, the entomological collections to occupy the second floor of the latter part of the extension.

Two incidents of prime importance are recorded in the report of the U.S. National Museum at Washington for the year ending June 30, 1910, namely, the practical completion of the new buildings and the transference of a large portion of the collections, and, secondly, the reception of the natural history collections made by the Roosevelt expedition to East Africa in 1909. The latter are estimated to comprise more than 11,000 specimens of vertebrates and a large number of invertebrates, as well as several thousand plants and a few ethnological objects. It is claimed that the collection of East African mammals is probably more valuable than any similar series in any other museum. "Its importance lies not so much in the number of new forms as in the fact that it affords an adequate basis for a critical study of the mammal fauna of East Africa, and the establishment or rejection of the large number of forms which have been described, especially in recent years, from insufficient material."

In the July number of *The Zoologist* Prof. McIntosh, of the Gatty Marine Laboratory, St. Andrews, records the results of a number of experiments made in Ireland and Scotland for the purpose of ascertaining whether salmon and trout are liable to injury by the turbines so frequently used in Irish mills, many of which revolve at a very high rate of speed. So long ago as 1892 a number of similar experiments were instituted by Sir Thomas Brady, who was of opinion that very few fry survived an experience with a turbine, believing that the great majority were killed at once as they went through, their bodies dropping into the deep water as they were struck. The experiments of Prof. McIntosh give a much more favourable aspect of the matter from the point of view of the fish. It is stated, for instance, that "in all the experiments, which were twenty in number, one feature was marked, viz. the comparative ease with which healthy trout in the turbine-pits kept free from the vortex caused by the action of the turbine. They appeared to go through the turbine only when they pleased or by accident. Moreover, when circumstances were favourable, they swam out of the turbine-pit to the head-race, and thus . . . could have passed up-stream to the nearest by-wash, if such existed."

DIRECTING attention to the varying descriptions of the manner in which fruit dispersal is effected by species of *Geranium*, Prof. W. Sorensen communicates the results

of his own observations in the current Bulletin (No. 2) of L'Académie Royale des Sciences et des Lettres de Danemark. The details commonly overlooked are the existence of an aborted ovule, the detachment of the seed, the position of the lines of dehiscence, and the devices by which in certain species the seeds are retained temporarily in the open pericarp. The species *sibiricum* and *molle* are described as illustrative examples of the two methods of pericarp shedding, and the peculiar features of *dissectum* are noted.

A CONSIDERATION of vegetative changes and the agencies inducing them, forming the subject of a presidential address delivered before the Association of American Geographers by Prof. H. C. Cowles, is published in *The Botanical Gazette* (March). Under physiographic agencies the author discusses regional and topographic successions; biotic factors are examined under the headings of humus, shade, and human agency. As an example of occasional plant plasticity, it is noted that the Douglas spruce may be a xerophytic pioneer, and then persist through successive stages of forest development, culminating in a mesophytic formation; throughout each stage it may be dominant, and yet it shows no striking change in leaf habit.

RICE cultivation in Siam provides the subject of an article contributed by Dr. C. C. Hosseus to the *Tropenpflanzer* (vol. xv., No. 6). Many varieties of rice are recognised by the Siamese, most of which fall under the common species *Oryza sativa*. In addition, three other species can be distinguished; *O. praecox* is a "wet" rice, yielding a grain very similar in its qualities to that of *O. sativa*, but is also cultivated on the mountain slopes; *O. glutinosa*, as its name implies, yields a glutinous grain, that is cooked by the tribes of the interior in bamboos, acquiring thereby a distinctive flavour; the fourth species is the "hill" rice, *O. montana*, less nutritious than ordinary rice, but preferred by the Laos tribes.

BEE-KEEPERS should find much to interest them in No. 447 of the Farmers' Bulletin, published by the U.S. Department of Agriculture, under the title "Bees," and written by Dr. E. F. Phillips, the official expert on bee-culture. Full instructions are given for the installation, equipment, and management of apiaries, with notes on the production of honey and wax; in fact, the bee-keeper will find information on all points connected with his trade or hobby.

THE mycologist of the Board of Agriculture, Trinidad, Mr. J. B. Rorer, describes a bacterial disease of plantains and bananas in the island (*Phytopathology*, i., No. 2, p. 45). The disease causes the leaves, progressively from below upwards, first to become yellow, then to droop, and finally to break off, and eventually the terminal bud is attacked, and the plant dies and rots down to the ground. The vascular bundles are filled with bacteria, pure cultures of which were obtained, and inoculations of them into healthy plants reproduced the disease.

THE flowers of Chaucer form the subject of an article by the Rev. H. N. Ellacombe now in course of publication in *The Gardeners' Chronicle*. In the issue of July 22 it is pointed out that although the box is an indigenous tree, it never had an English name, "box" being an Anglicised form of the Latin *buxus*. Chaucer mentions cedar, but apparently never saw a specimen. The same issue includes an illustrated account of the rock-garden in course of construction for the Royal Horticultural

Society at Wisley. The rocks are Wealden sandstone, some of the rocks weighing as much as a couple of tons. A large moraine forms one of the subjects of interest, below this being a bog-garden, watered from the source which supplies the moraine.

THE poultry investigations at the Maine Experiment Station are well known, and the recently issued bulletins will be read with interest by those engaged in similar work elsewhere. Messrs. Pearl, Surface, and Curtis have compiled an account of the common poultry diseases in a bulletin which must be regarded as one of the most useful yet issued for the practical man. The symptoms are clearly described, and such remedies as are known are indicated. In a more technical publication Dr. Pearl continues his discussion of the inheritance of fecundity in the domestic fowl.

THE Boyle lecture on the fertility of the soil delivered by Mr. A. D. Hall before the Oxford University Scientific Club has now been issued as a separate reprint. It is shown that Boyle and some of his contemporaries discussed the question of soil fertility, and especially the part played by nitre. The investigation was widened by Daubeny, professor of botany and rural economy in Oxford, and the real founder of a science of agriculture in this country, and in recent years has been shown to be even more complex by the intervention of the micro-organic flora of the soil. The factors determining fertility are, however, being slowly disentangled and brought under control.

THE German Mineralogical Society, which now consists of 158 members, under the presidency of Prof. F. Becke, of Vienna, at its annual meeting in September last decided on the publication of a journal, to be called the *Fortschritte der Mineralogie, Krystallographie, und Petrographie*, and the first number has just made its appearance, under the editorship of Prof. G. Linck, of Jena. It is an imposing volume of nearly 300 pages, and contains fourteen articles by distinguished members of the society. One of the earlier ones is by Prof. Baumhauer, on "Geometrical Crystallography," in which he deals with the "Law of the Complication and the Development of Crystal-faces in Zones rich in Faces," and discusses the most important recent contributions to crystallographical literature from this point of view. Then there are two articles by Prof. Mügge, of Göttingen, and Prof. F. Becke, the president, on "Twin-Crystals," in which many recent descriptions of new twin-forms are discussed and correlated, including the important work of Dr. Stefan Kreutz on twins of calcite. Another interesting and important article is that by Dr. Albert Ritzel on the "Rapidity of Crystallisation and Solution," in which the facts concerning the different speeds of growth of a crystal in different directions, and the corresponding differences in the times taken by a solvent in dissolving the material from the different faces of the crystal are carefully compiled from all the recent work on the subject, and the general results discussed. These examples will suffice to show the value of this new publication, which reminds us very much of the annual reports published by the Chemical Society, but goes further in including a considerable number of text-figures, and in embodying original results obtained by the authors themselves. We heartily congratulate the German Mineralogical Society on its venture, and shall look forward to seeing a continuation of these excellent articles, presenting in an interesting form the essence of the progress made in the subjects included in the purview of the society.

WORKS are now in operation for improving a section of the navigable channel of the Mississippi, and at the same

time developing the water resources of the river by the construction of an hydro-electrical plant, consisting of a power-house designed to contain machinery driven by turbines capable of developing 120,000 horse-power. This power-station lies about midway between Kansas City and Chicago, and 140 miles north-west of St. Louis. The site of the works is at the foot of the Des Moines rapids. These rapids now are only navigable at high stages of the river, and at other times vessels have to pass round them by means of a canal having three locks. When the works are completed there will only be a single lock, of dimensions sufficient to accommodate vessels of much larger size than those which now navigate this part of the river. The works include a concrete dam 1560 yards in length and 40 feet high, and the pool above formed by the dam will constitute a reservoir extending for forty or fifty miles.

AN instructive study of the mouth of the Scheld by F. Müller appears in the June number of the *Zeitschrift für Erdkunde*, in which the form and character of the river mouth, its tidal conditions and its development during the past five centuries, are detailed. The various towns are described, and in some cases illustrated, to show their varying fortunes during the same period. Similar studies of some British coastal settlements would form a profitable object for geographical research in this country. In the same number Prof. K. Kretschmer describes a number of early manuscript maps in the Bibliothèque Nationale at Paris, and analyses them.

THE demarcation of boundaries in Africa continues steadily, one of the most recent being that between Tunis and Tripoli. A French party carried out a geodetic and topographical survey of a zone 10 kilometres wide from Ras Ajedir on the Mediterranean coast to Ghadames, of which the position was determined to be lat.  $30^{\circ} 7' 48.7''$  N. and long  $7^{\circ} 9' 57.9''$  W. of Paris, or some 27 kilometres east of Duveyrier's original determination; the mean altitude of the oasis was found to be 340 metres above sea-level. This information, given in the April number of *La Géographie*, is supplemented in the May number by a description of the route by L. Pervinquière, who was detailed to study the geology of the country traversed.

THE Survey of India has just published an account of explorations made by Kintup, a native of Sikkim, in Bhutar, and on the lower Tsang-po, in 1886-7. He was despatched in July, 1880, with a Chinese Lama, from Darjeeling to Tibet by the late Captain Harman, and, after being detained in slavery in the Pemakoi country, finally succeeded in returning to India. He travelled along the Tsang-po, or Brahmaputra River, from the point where it turns southward towards India to the village of Mrii Padam, which he gives as about thirty-five miles from the British frontier. Though followed under very unfavourable conditions, the line of the river is probably indicated with fair accuracy, and goes part of the way towards filling the gap which has hitherto existed in our knowledge of the course of this great waterway.

NEW isothermal charts of Africa have been drawn for the atlas which is being prepared in the Survey Department of Egypt for use in Egyptian schools, and Mr. J. I. Craig gives those for January and July in the May number of *The Cairo Scientific Journal*. Temperatures have been reduced to sea-level, the gradient being taken as  $-0.6^{\circ}$  C. per 100 metres in the equatorial zone, and as  $-1^{\circ}$  C. per 100 metres in the drier region of North Africa, on the basis of kite observations at the Helwan Observatory. With the recent values employed the isotherms run somewhat differently from their courses as shown in earlier



charts. In July the highest temperature,  $34^{\circ}$  C., lies almost wholly to the east of the Nile, the greater part of the Sahara falling between that isotherm and that of  $32^{\circ}$  C.; and in Central Africa the isotherm of  $26^{\circ}$  C. extends southward to about latitude  $17^{\circ}$  S. in the basin of the Zambezi.

THE meteorological chart of the North Atlantic and Mediterranean for August (first issue, July 13), published by the Meteorological Committee, is of special interest in connection with the recent prolonged drought. The weather charts for July 6-12, and the useful summary which accompanies them, show that throughout that period a well-developed anticyclone dominated the situation over the eastern part of the ocean and western half of Europe; the temperature rose at places above  $90^{\circ}$ , and even to  $84^{\circ}$  in Iceland. For six out of the seven days this system of high barometric pressure lay practically motionless over these islands, and at the close of the period reports indicated the continuance of anticyclonic conditions of weather on the ocean.

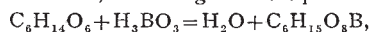
In an article in *Symons's Meteorological Magazine* for July, entitled "The Disappearance of Evening Cloud at Full Moon," Mr. W. Ellis, F.R.S., endeavours (owing to a recent reference to the subject) to refute the opinion held by Sir J. Herschel and others that the full moon possesses the faculty of clearing away clouds. This fallacy, like that of the artificial production of rain, is difficult to eradicate from the public mind. Mr. Ellis has shown from the Greenwich observations that a maximum cloudiness in the forenoon and a minimum in the evening represent the usual climatic variation. A change from a cloudy to a clear state in the evening sky is much more likely to attract attention when occurring near to full moon, and this is the opinion of leading meteorologists of the present day. Dr. W. N. Shaw (*Quart. Journ. R. Met. Soc.*, April, 1902) suggests a physical explanation of the phenomenon, viz. that a floating cloud loses heat by radiating into space more heat than it receives from the earth beneath; the water globules consequently evaporate, and the cloud will vanish. "Any effect of direct radiation of the moon may be quite properly disregarded." A more recent opinion in the same sense (to which we have before referred) is contained in Mr. J. R. Sutton's paper on the lunar cloud period (*Trans. South African Phil. Soc.*, December, 1907).

An article by Mr. D. Owen in *The Electrician* for July 7 places in a very clear light the importance which now attaches to the "lively dance of bright spots," first noticed by the English botanist Brown, in any liquid containing minute particles in suspension when illuminated from the side. Sixty years ago the observation attracted little attention, but recently, through the improvements which have given us the ultra-microscope, the experiments of M. Perrin and the theoretical work of Dr. Einstein, the study of the Brownian movements has thrown considerable light on the properties and motions of the ultimate particles of which matter is composed.

SEPARATE copies of several of Prof. Righi's recent papers have reached us, and to one of them, which deals with the effect of a magnetic field parallel to the axis of a vacuum tube on the electric discharge through the tube, we should like to direct special attention. If such a tube with aluminium disc electrodes 15 cm. apart is covered outside with tin foil and placed in a magnetising solenoid, Prof. Righi finds that a potential difference of 3000 volts between the electrodes, which is insufficient to cause a

measurable discharge in the absence of a magnetic field, will maintain a current through the tube with a field of 1250 gauss in the neighbourhood of the positive electrode, or a field of above 5000 gauss in the neighbourhood of the negative. He is disposed to attribute the phenomena to the production of electrons at the walls of the tube by the magnetic field, and is engaged in further work to test this hypothesis.

THE remarkable influence of borax in raising the rotatory power of mannitol has been known for nearly forty years, but the exact origin of this effect has been open to question, although the combination of the mannitol with the boric acid appeared the most probable explanation. It is therefore a matter of satisfaction that the compound should at last have been isolated and analysed. As described by Messrs. J. J. Fox and A. J. H. Guage in the June number of the *Chemical Society's Journal*, the compound is formed, according to the equation



by dissolving mannitol and boric acid in hot alcohol, filtering, and allowing to stand. The mannitoboric acid slowly separates in compact, colourless prisms, melting at  $89.5^{\circ}$ , but dissociates again when attempts are made to recrystallise it.

THE tenth volume of the *Transactions of the English Ceramic Society* (part i.) contains as a frontispiece a portrait of the president, Mr. H. Johnson, whilst a portrait of the first president, Mr. William Burton, is issued as a frontispiece to vol. i. The new issue includes two important technical papers on electricity for potters' machinery, by Mr. Odelberg, and on liquid fuel, by Mr. Kermode; these may be regarded as additions to a series of papers of which those on gas-firing were noted in these columns recently. Attention may also be directed to a paper by Dr. J. W. Mellor on the constitution of the kaolinite molecule, and to a paper on colour and its measurement by Mr. J. W. Lovibond. The value of the work done by this society in emphasising the importance of scientific methods in one of the leading industries of the country can scarcely be overestimated.

THE extension of the system of multiple evaporation in the manufacture of sugar has been limited by the fact that whilst the evaporation may be effected safely under normal and reduced pressures of steam, the sugar begins to decompose when steam under pressure is used. A report on the effect of high temperatures on cane sugar in solution, by Noël Deerr, issued from the Experiment Station of the Hawaiian Sugar Planters' Association, describes an investigation of considerable technical and scientific importance. It is shown that sugar inversion begins to be important at  $110^{\circ}$ , but may be checked by the addition of alkali; this causes the juice to darken, but much of the colour disappears when the alkali is neutralised, and the coloration in no way corresponds with loss of sugar. The conclusion is drawn that the local juices may be relied upon to stand half an hour's heating at  $120^{\circ}$  without loss of sugar, whilst under careful control and observation a temperature of  $125^{\circ}$  (or even  $130^{\circ}$  for shorter periods) is permissible. This conclusion is important, not only by reason of economy in evaporation, but also because a temperature of  $125^{\circ}$  is sufficient to produce almost instant sterilisation, an effect that cannot be produced with any certainty at  $100^{\circ}$ . A point of considerable scientific interest, dealt with incidentally in the paper, is the reciprocal interconversion of dextrose and laevulose when the solutions are heated either alone or in presence of alkalis.

MESSRS. GEORGE ALLEN AND CO., LTD., are about to publish a work on "Bushman Folk Lore," by W. I. Bleek and L. C. Lloyd. The volume will be fully illustrated with numerous specimens of Bushman drawings, and will contain a preface by Dr. G. McCall Theal.

### OUR ASTRONOMICAL COLUMN.

COMET 1911b (KIESS).—The numerous observations of Kiess's comet which appear in Nos. 4513-5 of the *Astronomische Nachrichten* agree in describing it as a nebulous mass some 2.5' to 5' in diameter, with a condensation some 40" to 50" across, but no definite nucleus. The estimates of the magnitude, as one would expect of such an object, vary considerably, but about July 10 the magnitude was approximately 8.0.

A forty-two minutes' exposure, made in a slit spectrograph attached to the reflector of the Königsstuhl Observatory, on July 11, showed 390  $\mu$ m to be the brightest band. The radiation 388  $\mu$ m was fainter, and its companion of shorter wave-length fainter still. While the 390  $\mu$ m line extended to a distance of  $1\frac{1}{2}'$  from the condensed centre, the much fainter line 467-476  $\mu$ m, with a maximum at 472  $\mu$ m, extended only to about  $\frac{1}{2}'$ . The bands 398-410  $\mu$ m and 423  $\mu$ m were extremely faint, and no continuous spectrum was shown on the plate.

Dr. Wolf adds that, as seen in the 12-inch refractor on

roughly corresponding to the mean horizon for London; after August 17 the distance from the earth begins to increase, and the comet also becomes invisible in these latitudes, its declination on August 18 being 35° S.

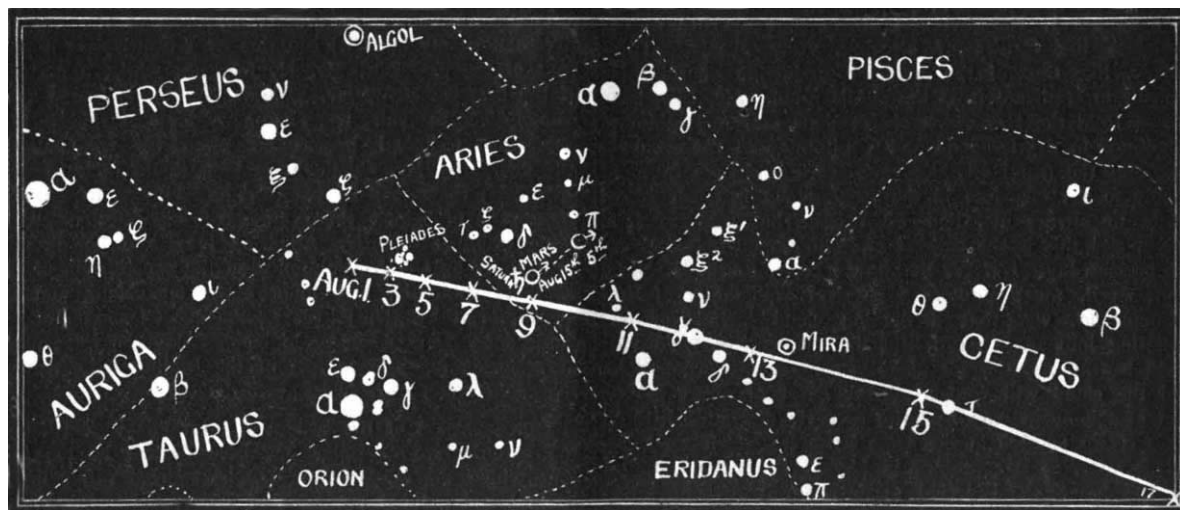
BROOKS'S COMET, 1911c.—Numerous observations recorded in No. 4515 of the *Astronomische Nachrichten* show that the magnitude of comet 1911c, during July 20-23, was about 10 or 11. Dr. Hartwig reports it, on July 22, as an irregular mass 2.5' in diameter, with a faint 0.5' condensation of the eleventh magnitude.

In the supplement Dr. Ebell gives provisional elements and a daily ephemeris extending to August 24. The elements give the time of perihelion as November 11, 1911, so that for some weeks we may expect the comet to brighten up, on account of both its decreasing distance and its increasing activity.

#### Ephemeris (12h. M.T. Berlin).

1911	$\alpha$ (true) h. m.	$\delta$ (true)	$\log r$	$\log \Delta$	mag.
Aug. 4 ...	21 56.4 ...	+29 42.0 ...	0.2760 ...	0.0264 ...	9.4
„ 8 ...	21 48.8 ...	+32 21.2 ...	0.2632 ...	0.0020 ...	9.2
„ 12 ...	21 39.7 ...	+35 6.7 ...	0.2500 ...	9.9783 ...	9.1
„ 16 ...	21 28.7 ...	+37 56.6 ...	0.2363 ...	9.9557 ...	8.9
„ 20 ...	21 15.6 ...	+40 48.2 ...	0.2221 ...	9.9345 ...	8.7
„ 24 ...	21 0.2 ...	+43 37.8 ...	0.2074 ...	9.9151 ...	8.5

Not only is this comet becoming brighter, its position for observation in these latitudes is improving. Its apparent path is from Pegasus towards  $\alpha$  Cygni, and the



Apparent Path of Comet 1911b. August 1-17, 1911.

July 8, the head showed a distinct dark space behind its centre, and a cone of matter was seen to be streaming out from the front of the coma. A brief observation by Herren Helffrich and Massinger showed a curved tail at least 1° long, but very faint.

Elements computed by Messrs. Einarsson and Meyer agree well with the corrected elements published by Dr. Kobold, and, with an ephemeris, appear in No. 4515. The following ephemeris is abstracted from that given by Dr. Kobold in No. 4514:—

1911	$\alpha$ (true) h. m.	$\delta$ (true)	$\log r$	$\log \Delta$	mag.
Aug. 3 ...	3 49.7 ...	+24 5.6 ...	...	...	...
„ 5 ...	3 40.1 ...	+21 29.4 ...	9.9993 ...	9.6711 ...	5.0
„ 7 ...	3 28.2 ...	+18 6.0 ...	...	...	...
„ 9 ...	3 13.0 ...	+13 29.3 ...	0.0226 ...	9.5442 ...	4.5
„ 11 ...	2 52.8 ...	+7 2.7 ...	...	...	...
„ 13 ...	2 25.2 ...	-2 1.6 ...	0.0452 ...	9.4013 ...	3.9
„ 14 ...	2 7.2 ...	-7 43.6 ...	...	9.3708 ...	...
„ 15 ...	1 46.9 ...	-14 15.8 ...	...	9.3439 ...	...
„ 16 ...	1 22.5 ...	-21 16.9 ...	...	9.3267 ...	...
„ 17 ...	0 54.0 ...	-28 26.1 ...	0.0670 ...	9.3212 ...	3.6

The positions in regard to the surrounding stars are shown approximately on the accompanying chart, the bottom line

last position given here is very near  $\xi$  Cygni; thus for some time it will transit, with a small zenith distance, not far from midnight.

HORARY NUMBER OF METEORS VISIBLE.—Mr. Denning's publication, in No. 4515 of the *Astronomische Nachrichten*, of the horary number of meteors visible for every night in the year comes at an opportune moment, for the outstanding feature of his comprehensive table is the heavy preponderance of meteors per hour in late July and early August. The numbers are deduced from the Bristol observations made during 1866-1911, and give the horary number for one observer watching a clear, moonless sky uninterruptedly. From a glance at the table the average number per hour for the first six months of the year would not exceed six; but early in July an increase sets in, which culminates in sixty-nine per hour on August 10, and averages nearly twenty-four per hour for the whole month.

CHARTS FOR THE SOUTHERN HEAVENS.—Dr. Ristenpart announces in No. 4514 of the *Astronomische Nachrichten* the publication of charts of the southern heavens by the Santiago Observatory. Five series, including fifty charts, will cover the sky between the south pole and declination 19° S., and series 1 and 2 (30° to 67° south) are now ready.